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ASSESMENT OF GROUNDWATER QUALITY AND HYDROGEOCHEMICAL CHARACTERIZATION AROUND MIDC AREA OF PADOLI, CHANDRAPUR DISTRICT MAHARASHTRA INDIA

Research Proposal submitted
In partial fulfillment of registration to
Ph.D Programme

In the Subject
Geology
Faculty of Science and Technology
Submitted by

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September 2022

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SYNOPSIS

ASSESMENT OF GROUNDWATER QUALITY AND HYDROGEOCHEMICAL CHARACTERIZATION AROUND MIDC AREA OF PADOLI, CHANDRAPUR DISTRICT MAHARASHTRA INDIA.

A BRIEF RESUME OF PROPOSED WORK

The proposed work aim to find out the quality of the ground water which get polluted due to the industrial activity and makes unhealthy to nearby habitats. As industries increases it directly or indirectly harms to the individual one. The proposed work is selected near to MIDC area of chandrapur region. Sampling will be taken from bore well and tap water from the region and physico-chemical parameter will be analysed. The outcome then compare to the standards of WHO for drinkable and agriculture purpose.

INTRODUCTION TO PROPOSED RESEARCH TOPIC

Water pollution is one the main concern of the proposed study. In most of the region the discharge of raw sewage into the natural water, sludge and toxic pollutants, chemical waste by industries etc. are dumped into the water.

The proposed research topic is mainly focusing on the effect of industrial waste water on ground water as well as surface water, of MIDC area, Padoli, Chandrapur region, Maharashtra. The obtained results will be compared with the WHO and Bureau of Indian standards BIS limits.

REVIEW OF LITERATURE

Ground water is one of the earth's most important resource. It exist wherever water penetrates beneath the surface. The subsurface water generally include chemical and physical properties. The groundwater present beneath surface in geological formations that can be collected with naturally or artificially. (Evaluation and Development of Ground Water, Gautam Mahajan)

Water is the elixir of life; without it life is not possible. Water is not present in same quantity everywhere as it depends on many factors. Civilizations have flourished with the development of reliable water supplies although it then collapsed as water supplies failed. A person requires 3liters of potable water per day to maintain the essential fluids of the body. (Applied Hydrology, C W Fetter)

Groundwater pollution may be defined as the artificially induced degradation of natural groundwater quality. Pollution can impair the use of water and can create hazard to public health through toxic or the spread of disease. Most pollution originates from the disposal of wastewater following the use of water for any of wide variety of purpose. Thus, a large number of source and cause can modify groundwater quality. (Groundwater Hydrology, Todd and Mays)

The major uses of water in industrial plants are for cooling, sanitation, manufacturing and processing. The quality of wastewater varies with types of industries and type of use. Ground pollution can occur where industrial wastewater are discharge into pits, ponds, lagoons etc. thereby enabling the wastes to migrates down to the water table. (Groundwater Hydrology, Todd and Mays)

The quality of groundwater is vary with Geology of the particular area, depth of water table, seasonal changes, composition of dissolved salts depending upon sources of salt and surface environment. Groundwater is the principal source of drinking water in both rural and urban parts of India. The

consequences of industrialization and urbanization leads to spoiling the water. This is observed that groundwater get polluted due to increased human population, agricultural runoff, domestic sewage, industrial effluents, addition of various kinds of pollutants and human activities .It is therefore necessary that the quality of water should be checked at regular time interval as well as to find out various sources which increased groundwater pollution (Das N.C. 2013).

INTRODUCTION

The modern industrialization (era) is one of the important sectors for the economic growth of the country. It provides all the essential and needy material to the society to sustain the life. Yet it has the great importance to the society but we cannot neglect the latent side of industry causing threats to the living habitats and environment.

Water is probably the most fundamental resource in sustaining life and yet most of the earth's water is unsuitable for drinking or agricultural uses. The world's total water resources are estimated at 1.36 x 10^8M ha-m. Of these global water resource, about 97.2% is salt water, mainly in ocean and only 2.58% is available as fresh water at any time on the planet earth. Out of this 2.8% of fresh water, about 2.2% is available as surface water and 0.6% as a ground water. Even out of this 2.2% of surface water, 2.15% is streams, the remaining 0.04% being in other forms. Out of 0.6% of stored groundwater, only about 0.25% can be economically extracted with the present drilling techniques. (Hydrology, H M Raghunath)

The sustainability of ground water for drinking purpose is judged on the basis of P^H, TDS, Total Hardness, Cl^-, ca+2, mg^{+2}, total alkalinity, sulphate (SO_4^{-2}), sodium, potassium etc. and sustainability of ground water for irrigation purpose is judges on the basis of sodium and electrical conductivity (EC).

STUDY AREA

Chandrapur district is one of the region among eleven of Vidarbha region of Maharashtra. It is well known for industries and Tadoba tiger reserve forest.it is bounded south by Telangana state, east by Gadchiroli district, north by Bhandara, Gondia, Nagpur and Wardha district and west by Yavtmal district.

Wardha River forms the western boundary and Wainganga River forms the eastern boundary of the district. The region lies between 19^0 30' and 20^0 45' north latitudes and 78^0 46' and 80^0 00' east longitudes.

The study area falls in part of the survey of India Toposheet number 55H, 55L, 56E and 56I covering of 10920 square kilometre of area. For the study, MIDC area of Padoli, Chandrapur (MS) situated on the bank of Erai river tributary of Wardha River.

GEOLOGY OF STUDY AREA

The area consist of Archean metamorphic rocks, Vindhyan limestone, Gondwana formation and Deccan trap. In Archean formation consisting granites and granitic genies occur in most of the eastern part of the district of extending north south from nagbhid to gondpipri. The rocks are generally devoid of primary porosity but weathering, jointing, fracturing and shearing etc. create secondary porosity within the ground water generally occur in phreatic conditions.

In Vindhyan, limestone are water bearing formation while sandstone due to its hard and compact nature it has poor ground water potential, vindhayn sediments mainly occur in north central part of

the district around tadoba and nagbhid parts of chimur, sindhewahi, bhadravati and in eastern part of the district in part of Chandrapur and rajura talukas.

Deccan trap basalt is observed in small area in the north-eastern and south-eastern peripheral part of the district and does not form a promising aquifer in the district. Weathered, jointed, fractured, massive, and vesicular forms and aquifer in the area.

In Gondwana formation comprising of kamthi and barakar sandstone and malleri and talchir shale occupy north-south extending stretch in central and southern part of the district in part of warora, bhadravati, Chandrapur, Ballarpur, rajura and gondpipari talukas.

OBJECTIVES

The main aim of the proposed work is the find out the impact of MIDC industries on ground water quality with respect to irrigation water, drinking water quality and ground water pollution status.

This will achieve through the following objectives

1. To find out the physico-chemical characteristics of ground water
2. To find out the ground water quality with respect to irrigation requirements
3. To find out the water quality with respect to drinking purpose
4. To find out the pollution status of ground water
5. To find out the lateral and vertical extension of pollution, if any
6. To demarcate potable and non-potable zone.
7. To find out the topographical variations with respect to ground water quality, if any

METHODOLOGY

Preliminary survey followed by detailed survey will be carried out. The plan include the well inventory during pre and post monsoon season. Selection of sampling site decided on the basis of overall objectives of the present study. Collection of ground water and effluent samples is to be carried out and the physico-chemical parameter will be analysed.

The sampling and field work will be carried out during pre and post monsoon season for three years. The pre monsoon samples will be collected in the month of May and post monsoon in the month of December. The physico-chemical parameter will be determined by the standard methods and the result of the same will be check by standard method of accuracy.

Field survey and sample analysis.

Detailed field survey will be conducted in MIDC and surrounding area.

Analysis of samples.

IMPORTANCE OF THE STUDY

International Status

The importance of groundwater assessment, development, utilization and management of the water resources of any region is being increasingly realised at all levels. It was in view this that the United Nations proclaimed the period of 1965-74 as the International Hydrological Decade during which

intensive efforts in hydrologic education research, development of analytical techniques and collection of hydrological information on a global basis were promoted in universities, research institute and government organisations. (Hydrology, H M Raghunath)

According to world business council for sustainable Development, it applies to situation where there is not enough water for all uses, whether drinking, agriculture or domestic. Defining thresholds for stress in terms of available of water per capita is more complex, however, entailing assumption per capita water use and its efficiency. Nevertheless, it has been proposed that when annual per capita renewable freshwater availability is less than 014700 cubic meter, countries begin to experience periodic or regular water stress. Below 1000 cubic meter, water scarcity begins to hamper economic development and human health and well-being.

National Status

Water is known as a natural solvent. Before it reaching to consumers tap it comes into contact with many different pollutants including organic and inorganic matter, chemicals and other contaminants. Many water system treat water with chlorine for reducing the concentration of contaminants. Although such steps can also lead to disinfection, change in taste, odor etc. can be objectionable and may become risk for one's health.

Today water treatment or monitoring water quality is a necessarily steps taken by many agencies to make it drinkable purpose.

Regional Status

The selected area is well known for its industries from coal, thermal power, pharma and chemical etc. that uses water for their purpose and releases to nearby streams, ponds, river making water pollution.

CGWB is monitoring the ground water quality of the district since the last four decades through its established monitoring wells. The objectives behind the monitoring are to develop an overall picture of the ground water quality of the district. During the year 2010, the Board has carried out the ground water quality monitoring of 22 monitoring wells. These wells mainly consist of the dug wells representing the shallow aquifer. The sampling of ground water from these wells was carried out in the month of May 2010 (premonsoon period). The water samples after collection were immediately subjected for the analysis of various parameters in the Regional Chemical Laboratory of the Board at Nagpur. The parameters analysed, include pH, Electrical Conductivity (EC), Total Alkalinity (TA), Total Hardness (TH), Nitrate (NO3) and Fluoride (F). The sample collection, preservation, storage, transportation and analysis were carried out as per the standard methods given in the manual of American Public Health Association for the Examination of Water and Wastewater (APHA, 1998). The ground water quality data thus generated was first checked for completeness and then the validation of data was carried out using standard checks. Subsequently, the interpretation of data was carried out to develop the overall picture of ground water quality in the district in the year 2010. (Ground Water Information, Chandrapur district MS. CGWB, Ministry of water resources, GOI)

Chandrapur city is developing rapidly due to industrialization since two decades. It is considered being fourth most polluted city in India. The present study was carried out with a view to have an understanding about the pollution status of Chandrapur district, particularly water quality in vicinity

of Industrial area. Environmental studies were carried out on ground and surface water to find out the physico-chemical parameters like pH, BOD, COD, DO, hardness, alkalinity, fluorides, chlorides, TDS and turbidity. Seven samples were collected from different sites, in order to evaluate the drinking water quality in and around Chandrapur district. The analysis of various parameters using standard methods (APHA/NEERI) and their comparison with WHO standard values, suggested that most of the parameters were within permissible limit given by Bureau of Indian standards (BIS). Concentration of parameters beyond the limits in some stations could be reduced and could be an invaluable source for domestic purposes in the region. The present paper accounts water quality of various sites situated in Chandrapur and their efficiencies respectively. (Quality assessment of drinking water: A case study of Chandrapur District (M.S.) Pratiksha Tambekar et all. Journal of Chemical and Pharmaceutical Research, 2012)

In order to evaluate the quality of groundwater in study area for its suitability for drinking purposes, sixty groundwater samples were collected during pre-monsoon period of the year 2011 and analysed for various parameters. Physical and chemical parameters of groundwater such as electrical conductivity, pH, total dissolved solids, Ca2+, Mg2+, Na+ , K+ , Cl− , CO3 2− , HCO3 − and SO4 2− , NO3 − , PO4 − , and F − were determined. The value of TDS, Cl− and SO4 − ion concentration is within the limits in majority of the samples. The excess amount of Ca++, Mg++, TH and NO3 − and F − in the groundwater is due to anthropogenic factors and geological characteristics of the aquifer. Assessment of groundwater samples indicated that groundwater in study area is chemically not suitable for drinking uses.(Assessment of Groundwater Quality and its Suitability for Drinking Uses in Warora tehsil, District Chandrapur, India. S.M.Deshapnde et all International Journal of Recent Trends in Science And Technology, ISSN 2277-2812 E-ISSN 2249-8109, Volume 4, Issue 3, 2012 pp 120-124)

Groundwater is the most vital natural resource used for drinking purpose by many us people around the world, especially in arid and semi-arid areas. This resource cannot be used sustainably unless the quality of groundwater is assessed. The present investigation deals with the study of physicochemical parameters i.e. Temperature, pH, Electrical Conductivity, Turbidity, Total Solids, Total Dissolved Solids, Total Suspended Solids, Dissolved Oxygen, Alkalinity, Hardness, Chloride, Sulphate and Fluoride in water samples of dug wells and bore well in Chandrapur city, Vidarbha Region, Central India. The sample were collected from six different sapling location of Chandrapur city. This all dug well and bore well are in daily use and some are used for drinking purpose. All the results were compared with the standards prescribed by Bureau of Indian standards 10500-2012. Most of results are within permissible limits but some are above permissible limit, hence the water cannot be used directly for portable purposes. (Evaluation of Groundwater quality of chandrapur city, vidarbha region, central India. S.K. Gudadhe et al. Vidyabharati International Interdisciplinary Research Journal)

SCOPE OF THE STUDY

The scope of the present study is to minimize the effect of industrial pollutants and to enhance the awareness about the diseases caused by harmful water. To make some measures for polluted water and make drinkable purpose and agriculture also. To take remedial measures by industries to reduce the contamination of water.

SIGNIFICANCE OF STUDY

For the study, MIDC area of Padoli, Chandrapur region selected which consist of number of industries. The present study deals with the assessment of impact of industry pollution with respect to physico-chemical parameter and their effect of water both ground and surface water.

It is necessary to find out various sources of contamination of surface and groundwater.

PROPOSED PLAN OF STUDY

1. First year: field work in the propose area, a review of published literature on ground water will be carried out. Published data from GSI, CGWB, GSDA and other institution will be collected specific to study area.
2. Second year: field work and collection of samples (Bore well, Dug well and Surface water), analysis of samples and data tabulation with various statistical method.
3. Third year: a) Interpretations of data
   b) Writing of thesis
   c) Presentation in seminars
   d) Publication in research papers

EXPECTED OUTCOME OF STUDY

The expected outcome of the study will be the analysis of three years sampling data of the MIDC area from 1both well water and tap water (Pre and Post Monsoon on May and December resp.) and then comparing with standards given by WHO for drinkable and agriculture purpose.

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